

Abe Jacobson
ajacobson@lanl.gov
8 February 2000

Using the DAS/NLDN database tool

(1) Introduction

This note describes a database tool for FORTE workers to access and use DAS/NLDN coincidences.

(2) Caveat on the DAS/NLDN coincidences included here

Data returned with a sferic type “0” are without a valid vertical-current estimate. Likewise, data returned with a sferic type “C” (for intracloud) should not be regarded as providing a vertical-current estimate that means very much.

(3) Data product

The DAS/NLDN coincidences are stored in day files, one file per day, in the subdirectory:

/n/projects/sat/idl/cnc

For example, a day file is /n/projects/sat/idl/cnc/19980601.cnc.

The DAS/NLDN coincidences in a cnc file are included out to +/- 200 millisec. The reliable coincidences are those which occur in the range

$$-300 \text{ microsec} < \text{tdif} < +300 \text{ microsec}$$

Within this range, the statistical false correlation rate is only on the order of 2%, so you can use the geolocations (deriving from NLDN) quite reliably on the rf data.

The other entries in the cnc files are included so that the flash environment can be captured, i.e., DAS events from the same flash, or NLDN events from the same flash.

The dayfile is read by an IDL subroutine called “readcnc.pro”, which is being placed on the common area for FORTE users;

The subroutine readcnc gets data as follows:

```
;+
;This reads an unformatted coincidence file (sferic and Forte within
;+/- 200 millisec) and places the params into arrays.
;Noto bene: the +/- 200 millisec criterion is BEFORE correction for the
;time-of-flight from the sferic putative location to Forte. If that
;location is wrong, or if the coincidence is not true, then the time
;difference in the file can be greater in magnitude than 200 millisec.
;
;Input:
;    cncfile=string const or variable indicating full path to cnc file
;
;Outputs:
;    nglob=number of events in parent lgu file (not essential info)
;    icount=number of lgu events in lat-lon-date cube
;    jcount=number of lgu events in cube within sferic epoch
;    mcount=number of sferics within the jcount-Forte events' epoch..
;    nc=number of coincidences within +/- 200 milliseconds found..
;The following outputs are all arrays of long dimension =nc:
;    sferich=UT hour bytarr(nc)
;    sfericm=UT minute bytarr(nc)
;    sferics=UT seconds fltarr(nc)
;    sfericlat=north lat (deg) fltarr(nc)
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; sfericlon=east longitude (deg) fltarr(nc)
; sfericsig=NLDN signed stroke amplitude fltarr(nc)
; sferictype=NLDN stroke ID (either "G" or "C") strarr(nc) one-byte
; tdif=sferic-Forte time dif (sec) dblarr(nc)
; longday=long-integer for yyymmdd, e.g. "19971101" of parent das
file
; longsec=long-integer for hhmmss, e.g. "182216" of parent das file
; nth=event number ("nth" in call to fql) in parent das file
; nsamples=long-int number of samples in event in parent das file
; longi=east longitude report (deg) in parent das file
; lati=north latitude report (deg) in parent das file
; alti=altitude report (km) in parent das file
; lsec=long-int elapsed GPS seconds of event (use in es2str)
; dsec=double-precision remainder GPS sec (use in es2str)
; freqa=float center frequency of TATRA band (12 MHz above band
bottom)
; freqb=float center frequency of TATRB band (12 MHz above band
bottom)
; bpa1=byte elog.preamp1
; bpa2=byte elog.preamp2
; bpbu=byte elog.buantpwr
; bat=bytarr(2,nglob) =elog.anttype
; bcode=byte elog.trigsrccode
; nb=long-int number of TATR samples before trigger
; bpa=byte elog.tatra.power
; bpb=byte elog.tatrb.power
; baa=byte elog.tatra.antenna
; bab=byte elog.tatrb.antenna
; nsub=number of subsamples (128 TATR samples, moved 128/16
forward)
; subsamp=time step (millisec) between subsamples
; atec=TATRA fitted slant TEC in units of 10**17 m**-2
; btec=TATRB fitted slant TEC in units of 10**17 m**-2

```

; contrasta=peak:med power ratio of pre-whitened, dechirped TATRA
; contrastb=peak:med power ratio of pre-whitened, dechirped TATRB
; widtha=1/e width (millisec) of pri. peak, TATRA clean autocor.
; widthb=1/e width (millisec) of pri. peak, TATRB clean autocor.
; snra=snr of secondary peak (0 if not tallied) of TATRA clean autocor.
; snrb=snr of secondary peak (0 if not tallied) of TATRB clean autocor.
; powa=avg power ((v/m)**2 onto satellite) for TATRA
; powb=avg power ((v/m)**2 onto satellite) for TATRB
; powpeaka=peak ((v/m)**2 onto satellite) for TATRA
; powpeakb=peak ((v/m)**2 onto satellite) for TATRB
; splita=delay (millisec) for second pulse wrt first for TATRA tipps
; splitb=delay (millisec) for second pulse wrt first for TATRB tipps
; vel=velocity (m/s) array (0:nc-1,0:2) vx,vy,vz in ecef coords
;-

```

To call the routine, paste the following lines into your IDL codes:

```

readcnc,cncfile,nglob,icount,jcount,mcount,nc,$
sferich,sfericm,sferics,sfericlat,sfericlon,sfericsig,sferictype,tdif,$
longday,longsec,nth,nsamples,longi,lati,alti,$
lsec,dsec,freqa,freqb,bpa1,bpa2,bpbu,bat,bcode,nb,bpa,bpb,baa,bab,bsub,$
subsamp,atec,btec,contrast,a,contrastb,widtha,widthb,snra,snrb,$
powa,powb,powpeak,a,powpeakb,splita,splitb,vel

```